

CLAIMS

1. A hierarchical suspension control system in a wheeled vehicle, comprising:
 - a plurality of damper assemblies, each damper assembly operatively connected between a vehicle body and a corresponding vehicle wheel, each damper assembly including an integrated sensor and an integrated local controller with a drive unit connected to a damping control component of the damper assembly;
 - a central controller connected for communication with the integrated local controller of each damper assembly;
 - wherein, at least during certain times, the local controller of each damper assembly controls the damper assembly independently of the central controller for carrying out at least one local suspension control function of the damper assembly;
 - wherein, at least during certain other times, the central controller communicates with the local controller of each damper assembly for overriding the at least one local suspension control function.
2. The hierarchical suspension control system of claim 1 wherein the at least one local suspension control function comprises one or more of a temperature compensation function, a failsafe function, a wheel control function and a linearizational response function.
3. The hierarchical suspension control system of claim 1 wherein the central controller operates to override the at least one local suspension control functions when the central controller determines that one or more criteria are met.
4. The hierarchical suspension control system of claim 3 wherein the central controller receives input from at least one sensor and the one or more criteria are related to the input received from the at least one sensor.

5. The hierarchical suspension control system of claim 1, wherein the damper control component comprises a damper coil.
6. The hierarchical suspension control system of claim 5 wherein the power drive unit includes a shunt resistor connected in series with the damper coil and a feedback line connected between the shunt resistor and damper coil.
7. A hierarchical suspension control system, comprising:
 - 10 a plurality of damper assemblies, each damper assembly including an integrated velocity sensor and an integrated local controller with a drive unit connected to a damping control component of the damper assembly;
 - 15 a central controller connected for communication with the integrated local controller of each damper assembly;
 - at least one sensor providing ride condition input to the central controller;
 - wherein, the local controller of each damper assembly normally controls the damper assembly independently of the central controller for carrying out at least one local suspension control function of the damper assembly;
 - 20 wherein the central controller monitors the at least one sensor to identify when one or more drive condition criteria are met and, when the one or more drive condition criteria are met, communicates with the local controller of one or more of the damper assemblies so as to affect suspension control functions of the one or more damper assemblies.
- 25 8. A suspension control system in a wheeled vehicle, comprising:
 - 30 a plurality of damper assemblies, each damper assembly operatively connected between a vehicle body and a corresponding vehicle wheel, each damper assembly including an integrated sensor and an integrated local controller with a drive unit connected to a damping control component of the damper assembly;

wherein the local controller of each damper assembly independently controls its damper assembly without reference to control operations being carried out by the local controllers of other damper assemblies.

- 5 9. A self-contained piston damper unit, comprising:
 - a damper body;
 - a piston rod that is axially movable within the damper body and that is attachable to a vehicle body;
 - a relative velocity sensor providing an output indicative of relative
- 10 velocity as between the piston rod and damper body;
 - a local controller connected to receive an output of the relative velocity sensor and including a drive unit connected for energizing a damper coil of the damper unit, the local controller configured for independently controlling energization of the damper coil throughout a range of energization levels and at least partly in response to the output of the relative velocity sensor;
 - 15 wherein the damper body, piston rod, relative velocity sensor and local controller with damper coil drive unit are integrated into a single assembly mountable as a unit to a vehicle.
- 20 10. The self-contained piston damper unit of claim 8 wherein the unit includes a housing compartment containing the local controller.
11. The self-contained piston damper unit of claim 10 wherein the local controller includes an interface enabling connection to an external controller.
- 25 12. The self-contained piston damper unit of claim 11 wherein the housing compartment includes at least one port associated with the interface of the local controller for connecting to a communication line.
- 30 13. The self-contained piston damper unit of claim 12 wherein the housing compartment includes at least one other port for connecting to a power line.

14. In a suspension control system of a wheeled vehicle including multiple damper assemblies, each damper assembly associated with a respective wheel of the vehicle, a method for effecting suspension control functions by the damper assemblies, the method comprising the steps of:

- 5 providing each damper assembly with an integrated local controller and associated damping component drive unit;
- connecting the damping component drive unit of each damper assembly to a power source;
- configuring the local controller of each damper assembly to
- 10 independently effect one or more local suspension control functions without reference to local suspension control functions being carried out by the other damper assemblies.

15. The method of claim 14, further comprising the steps of :

- 15 connecting the integrated local controller of each damper assembly for communication with a central controller;
- configuring the central controller to carry out at least one override suspension control function via communication with the local controller of each damper assembly.